^{197}Bi ε decay (9.33 min) 1991Va09

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Huang Xiaolong, Zhou Chunmei	NDS 104, 283 (2005)	1-Jan-2002

Parent: ^{197}Bi: E=0; J^π=(9/2$^-$); $T_{1/2}$=9.33 min *50*; Q(ε)=5061 *10*; %ε+%$β^+$ decay=100.0

Sources produced by Re(^{16}O,xn) and Ir(^{14}N,pxn) (1991Va09).

1991Va09: measured Eγ, Iγ, Ice, Ix-ray, γγ(t), eG(t), γ(x-ray)(t) by HpGe, LeGe, Si(Li) detectors. 86% γ-intensities have been placed in ^{197}Pb level scheme.

^{197}Pb Levels

E(level)†	Jπ‡	$T_{1/2}$@	E(level)†	Jπ‡
0	3/2$^-$#	8.1 min *17*	1553.85 *18*	(5/2,7/2)$^-$
84.88 *7*	5/2$^-$#		1571.18 *14*	$^-$
319.31 *11*	13/2$^+$#	42.9 min *9*	1577.9 *3*	(9/2)$^-$
952.05 *10*	7/2$^-$		1588.02 *17*	11/2$^+$,13/2$^+$,15/2$^+$
988.95 *10*	(5/2)$^-$		1624.45 *14*	11/2$^+$
1015.34 *22*	(5/2,7/2)$^-$		1633.71 *14*	11/2$^+$,13/2$^+$
1079.39 *12*	(7/2,9/2)$^-$		1648.9 *3*	3/2$^-$,5/2$^-$,7/2$^-$
1089.41 *8*	5/2$^-$		1675.9 *3*	5/2$^-$
1147.50 *13*	11/2$^+$		1689.1 *3*	3/2$^+$,5/2$^+$,7/2$^+$
1164.88 *12*	(9/2)$^-$		1730.0 *4*	
1166.66 *8*	(7/2)$^-$		1739.92 *20*	9/2$^+$,11/2$^+$,13/2$^+$
1173.77 *12*	9/2$^+$		1748.9 *4*	
1295.12 *14*	13/2$^+$,15/2$^+$		1773.57 *15*	9/2$^+$
1430.52 *15*	13/2$^+$		1922.06 *13*	(5/2,7/2,9/2)$^+$
1472.89 *12*	(7/2)$^-$		1946.07 *21*	11/2$^+$
1495.05 *22*	3/2$^-$,5/2$^-$,7/2$^-$		1985.41 *23*	
1518.79 *12*			2024.3 *4*	
1524.56 *12*	9/2$^+$		2059.3 *3*	
1525.09 *12*	7/2$^+$		2200.55 *21*	13/2$^+$

† From decay scheme and Eγ using least-squares fit to data.
‡ From γ-multipolarity, except as noted.
# From Adopted Levels.
@ From Adopted Levels.

ε,$β^+$ radiations

E(decay)	E(level)	E(decay)	E(level)	E(decay)	E(level)	E(decay)	E(level)
(3287 *10*)	1773.57	(3536 *10*)	1524.56	(3894 *10*)	1166.66	(4046 *10*)	1015.34
(3385 *10*)	1675.9	(3588 *10*)	1472.89	(3896 *10*)	1164.88	(4072 *10*)	988.95
(3437 *10*)	1624.45	(3630 *10*)	1430.52	(3914 *10*)	1147.50	(4109 *10*)	952.05
(3507 *10*)	1553.85	(3766 *10*)	1295.12	(3972 *10*)	1089.41	(4742 *10*)	319.31
(3536 *10*)	1525.09	(3887 *10*)	1173.77	(3982 *10*)	1079.39	(4976 *10*)	84.88

γ(^{197}Pb)

Iγ normalization: Cannot be given. Total of 63 γ-lines out of 127 from ^{197}Bi (9.33 min) have been placed in level scheme, this corresponds to 86% of the total γ-intensity.

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[@]	Comments
84.9 *1*	95 *22*	84.88	5/2$^-$	0	3/2$^-$	M1[#]	2.92	α(L)=2.23; α(M)=0.523; α(N+..)=0.171
x169.1 *3*	0.8 *3*							
x180.7 *3*	0.6 *3*							
x203.2 *3*	0.2 *1*							
x208.0 *3*	1.1 *2*							
x211.0 *3*	0.6 *2*							
x219.4 *3*	1.8 *3*							
229.4 *3*	2.5 *3*	1524.56	9/2$^+$	1295.12	13/2$^+$,15/2$^+$			
234.4 *1*	20 *3*	319.31	13/2$^+$	84.88	5/2$^-$	M4	62.2	α(K)exp=9.93 *150*; α(K)exp/α(L)exp=0.7 *1* α(K)=22.7 *7*; α(L)=28.4 *9*; α(M)=8.3 *3*; α(N+..)=2.86 *9* Additional information 1.
292.9 *1*	16.3 *4*	1588.02	11/2$^+$,13/2$^+$,15/2$^+$	1295.12	13/2$^+$,15/2$^+$	M1	0.474	α(K)exp=0.44 *14*; α(L)exp=0.0536 *68* α(K)=0.387 *12*; α(L)=0.0664 *20*; α(M)=0.0156 *5*; α(N+..)=0.00504 *16*
x319.2 *3*	2.3 *2*							
x323.1 *3*	1.9 *3*							
x325.1 *3*	0.8 *2*							
329.5 *3*	3.6 *2*	1624.45	11/2$^+$	1295.12	13/2$^+$,15/2$^+$			
x331.4 *3*	0.7 *2*							
350.8 *1*	12.2 *4*	1524.56	9/2$^+$	1173.77	9/2$^+$	E0+M1+E2	≥0.6	α(K)exp=0.466 *37*; α(L)exp=0.0932 *78*
377.6 *3*	3.5 *4*	1525.09	7/2$^+$	1147.50	11/2$^+$			
405.4 *3*	2.1 *3*	1495.05	3/2$^-$,5/2$^-$,7/2$^-$	1089.41	5/2$^-$	M1	0.197	α(K)exp=0.192 *33*; α(L)exp=0.0229 *67* α(K)=0.161 *5*; α(L)=0.0274 *9*; α(M)=0.00640 *20*; α(N+..)=0.00208 *7*
424.0 *3*	1.7 *3*	1571.18	$^-$	1147.50	11/2$^+$			
x435.0 *3*	1.5 *3*							
450.8 *3*	5.5 *3*	1624.45	11/2$^+$	1173.77	9/2$^+$			
x459.8 *3*	2.5 *4*							
468.9 *3*	1.9 *2*	1633.71	11/2$^+$,13/2$^+$	1164.88	(9/2)$^-$			
477.0 *3*	1.3 *3*	1624.45	11/2$^+$	1147.50	11/2$^+$	E0+M1+E2	≥0.6	α(K)exp=0.57 *20*
486.0 *3*	3.0 *10*	1633.71	11/2$^+$,13/2$^+$	1147.50	11/2$^+$			
520.8 *3*	4.5 *3*	1472.89	(7/2)$^-$	952.05	7/2$^-$	M1	0.102	α(K)exp=0.0948 *53* α(K)=0.0830 *25*; α(L)=0.0140 *5*
559.5 *3*	6.1 *3*	1648.9	3/2$^-$,5/2$^-$,7/2$^-$	1089.41	5/2$^-$	M1+E2	0.05 *3*	α(K)exp=0.0362 *82* α(K)=0.04 *3*; α(L)=0.008 *4*
x564.4 *3*	4.6 *6*							
566.2 *2*	6.7 *4*	1739.92	9/2$^+$,11/2$^+$,13/2$^+$	1173.77	9/2$^+$			
572.5 *1*	27.1 *4*	1524.56	9/2$^+$	952.05	7/2$^-$	E1+M2	0.11 *11*	α(K)exp=0.0090 *11* α(K)=0.09 *9*; α(L)=0.018 *18*

γ(^{197}Pb) (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[@]	Comments
575.1 *3*	7.5 *12*	1748.9		1173.77	9/2$^+$			
592.3 *3*	2.7 *4*	1739.92	9/2$^+$,11/2$^+$,13/2$^+$	1147.50	11/2$^+$	M1	0.0724	α(K)exp=0.057 *11* α(K)=0.0592 *18*; α(L)=0.0099 *3*
600.0 *3*	3.2 *3*	1773.57	9/2$^+$	1173.77	9/2$^+$	E0+M1+E2	≥0.09	α(K)exp=0.085 *14*
601.8 *3*	6.5 *4*	1553.85	(5/2,7/2)$^-$	952.05	7/2$^-$	E2	0.0193	α(K)exp=0.0192 *28* α(K)=0.0142 *5*; α(L)=0.00380 *12*
619.4 *3*	8.2 *3*	1571.18	$^-$	952.05	7/2$^-$	E2+M1	0.041 *24*	α(K)exp=0.0268 *31* α(K)=0.033 *20*; α(L)=0.006 *3*
626.0 *1*	10.5 *4*	1773.57	9/2$^+$	1147.50	11/2$^+$	M1+E2	0.040 *23*	α(K)exp=0.0392 *88* α(K)=0.032 *19*; α(L)=0.006 *3*
[x]636.7 *3*	1.3 *3*							
[x]643.0 *3*	2.4 *3*							
650.8 *3*	1.0 *2*	1946.07	11/2$^+$	1295.12	13/2$^+$,15/2$^+$	E0+M1+E2	>0.11	α(K)exp=0.11 *3*
[x]684.1 *3*	2.7 *4*							
[x]698.3 *3*	3.3 *2*							
[x]728.5 *3*	1.6 *3*							
741.0 *3*	5.3 *4*	1730.0		988.95	(5/2)$^-$			
755.4 *1*	12.1 *4*	1922.06	(5/2,7/2,9/2)$^+$	1166.66	(7/2)$^-$	E1	0.00423	α(K)exp=0.0032 *10* α=0.00423; α(K)=0.00350 *11*; α(L)=0.00054 *2*
772.1 *3*	4.8 *3*	1946.07	11/2$^+$	1173.77	9/2$^+$	M1	0.0364	α(K)exp=0.0391 *54* α(K)=0.0298 *9*; α(L)=0.00496 *15*
[x]783.7 *3*	2.3 *3*							
[x]786.0 *3*	3.6 *4*							
818.5 *3*	2.2 *4*	1985.41		1166.66	(7/2)$^-$			
828.2 *1*	85.0 *10*	1147.50	11/2$^+$	319.31	13/2$^+$	E2	0.0098	α(K)exp=0.00830 *68*; α(L)exp=0.00155 *26* α(K)=0.00762 *23*; α(L)=0.00163 *5*
[x]836.9 *3*	2.9 *3*							
[x]846.8 *3*	2.0 *3*							
854.5 *1*	100	1173.77	9/2$^+$	319.31	13/2$^+$	E2	0.0092	α(K)exp=0.00769 *63*; α(L)exp=0.00173 *29* α=0.0092; α(K)=0.00719 *22*; α(L)=0.00151 *5*
[x]859.5 *3*	3.2 *3*							
867.2 *1*	86.7 *11*	952.05	7/2$^-$	84.88	5/2$^-$	M1	0.0270	α(K)exp=0.0224 *18*; α(L)exp=0.00401 *39* α(K)=0.0221 *7*; α(L)=0.00367 *11*
[x]891.5 *1*	10.8 *4*					E2	0.0084	α(K)exp=0.0068 *11* α=0.0084; α(K)=0.00663 *20*; α(L)=0.00137 *4*
904.5[&] *3*	2.9[&] *3*	988.95	(5/2)$^-$	84.88	5/2$^-$	M1	0.0242	α(K)exp=0.0147 *16* α(K)=0.0198 *6*; α(L)=0.00329 *10*
904.5[&] *3*	2.9[&] *3*	2200.55	13/2$^+$	1295.12	13/2$^+$,15/2$^+$	M1	0.0242	α(K)exp=0.0147 *16* α(K)=0.0198 *6*; α(L)=0.00329 *10*
[x]924.7 *3*	3.2 *3*							
930.5 *3*	2.5 *3*	1015.34	(5/2,7/2)$^-$	84.88	5/2$^-$			
952.1 *3*	8.3 *4*	952.05	7/2$^-$	0	3/2$^-$	E2	0.00741	α(K)exp=0.0060 *15* α=0.00741; α(K)=0.00586 *18*; α(L)=0.00117 *4*

^{197}Bi ε decay (9.33 min) 1991Va09 (continued)

γ(^{197}Pb) (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[@]	Comments
[x]954.9 *3*	6.7 *4*							
[x]963.5 *3*	1.5 *4*							
969.9 *3*	7.6 *4*	2059.3		1089.41	5/2⁻			
975.7 *1*	34.9 *7*	1295.12	13/2⁺,15/2⁺	319.31	13/2⁺	E2+M1	0.013 *7*	α(K)exp=0.00733 *77* α(K)=0.011 *6*; α(L)=0.0019 *8*
[x]986.5 *3*	2.9 *4*							
988.9 *1*	25.9 *6*	988.95	(5/2)⁻	0	3/2⁻	E2+M1	0.013 *7*	α(K)exp=0.00701 *68* α(K)=0.011 *6*; α(L)=0.0018 *8*
994.5 *1*	17.7 *5*	1079.39	(7/2,9/2)⁻	84.88	5/2⁻	E2	0.00681	α(K)exp=0.00558 *74* α=0.00681; α(K)=0.00540 *17*; α(L)=0.00106 *4*
1004.5 *1*	49.0 *8*	1089.41	5/2⁻	84.88	5/2⁻	E2	0.00668	α(K)exp=0.00586 *47* α=0.00668; α(K)=0.00530 *16*; α(L)=0.00103 *3*
[x]1009.2 *3*	1.2 *2*							
1015.3 *3*	2.6 *3*	1015.34	(5/2,7/2)⁻	0	3/2⁻			
[x]1019.6 *3*	1.5 *3*							
1033.6 *3*	2.4 *3*	1985.41		952.05	7/2⁻			
1035.3 *3*	1.1 *3*	2024.3		988.95	(5/2)⁻			
[x]1052.2 *3*	1.7 *3*							
1053.7 *3*	1.8 *3*	2200.55	13/2⁺	1147.50	11/2⁺			
[x]1059.9 *3*	0.4 *2*							
1080.0 *1*	45.4 *8*	1164.88	(9/2)⁻	84.88	5/2⁻	E2	0.00580	α(K)exp=0.00472 *56* α=0.00580; α(K)=0.00463 *14*; α(L)=0.00088 *3*
1081.7 *1*	17.3 *4*	1166.66	(7/2)⁻	84.88	5/2⁻	M1	0.0153	α(K)exp=0.0112 *28* α(K)=0.0125 *4*; α(L)=0.00207 *7*
1089.4 *1*	16.7 *5*	1089.41	5/2⁻	0	3/2⁻	E2+M1	0.010 *5*	α(K)exp=0.00771 *65* α(K)=0.008 *4*; α(L)=0.0014 *6*
[x]1100.8 *3*	1.7 *3*							
1111.2 *1*	16.5 *5*	1430.52	13/2⁺	319.31	13/2⁺	E0+M1+E2	≥0.05	α(K)exp=0.0425 *46*; α(L)exp=0.0070 *11*
1166.7 *1*	36.6 *6*	1166.66	(7/2)⁻	0	3/2⁻	E2	0.00500	α(K)exp=0.00425 *44* α=0.00500; α(K)=0.00402 *12*; α(L)=0.00074 *2*
[x]1172.2 *3*	2.1 *3*							
[x]1184.8 *3*	0.20 *5*					E0+M1+E2	>0.05	α(K)exp=0.0493 *64*; α(L)exp=0.00793 *87*
[x]1188.8 *3*	2.4 *3*							
1205.2 *3*	3.3 *3*	1524.56	9/2⁺	319.31	13/2⁺			
[x]1212.7 *3*	1.8 *3*							
[x]1227.0 *3*	2.5 *3*					E2	0.00455	α(K)exp=0.055 *10* α=0.00455; α(K)=0.00367 *11*; α(L)=0.00066 *2*
1251.8 *1*	24.5 *6*	1571.18	–	319.31	13/2⁺	E1+M2	0.013 *12*	α(K)exp=0.00280 *37* α(K)=0.011 *10*; α(L)=0.0019 *17*
[x]1286.8 *3*	2.0 *3*							
1305.1 *1*	18.2 *6*	1624.45	11/2⁺	319.31	13/2⁺	M1+E2	0.007 *3*	α(K)exp=0.00453 *54* α=0.007 *3*; α(K)=0.0055 *23*; α(L)=0.0009 *4*
1314.4 *1*	17.7 *5*	1633.71	11/2⁺,13/2⁺	319.31	13/2⁺	M1	0.0093	α(K)exp=0.00643 *65* α=0.0093; α(K)=0.00767 *23*; α(L)=0.00126 *4*

$^{197}_{82}Pb_{115}$-4

^{197}Bi ε decay (9.33 min) 1991Va09 (continued)

γ(^{197}Pb) (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[@]	Comments
[x]1359.9 *3*	1.2 *3*							
[x]1365.8 *3*	4.9 *4*					M1	0.0085	α(K)exp=0.0075 *12* α=0.0085; α(K)=0.00696 *21*; α(L)=0.00114 *4*
1388.0 *1*	22.2 *6*	1472.89	(7/2)$^-$	84.88	5/2$^-$	E2	0.00361	α(K)exp=0.00201 *65* α=0.00361; α(K)=0.00293 *9*; α(L)=0.00051 *2*
[x]1404.6 *3*	6.7 *4*					M1+E2	0.0057 *22*	α(K)exp=0.00456 *80* α=0.0057 *22*; α(K)=0.0047 *19*; α(L)=0.0008 *3*
1410.4 *3*	4.2 *4*	1495.05	3/2$^-$,5/2$^-$,7/2$^-$	84.88	5/2$^-$	M1	0.00782	α(K)exp=0.0077 *12* α=0.00782; α(K)=0.00642 *20*; α(L)=0.00105 *4*
1433.9 *1*	10.9 *4*	1518.79		84.88	5/2$^-$			
1440.2 *1*	21.6 *6*	1525.09	7/2$^+$	84.88	5/2$^-$	E1	0.00133	α(K)exp=0.00148 *53* α=0.00133; α(K)=0.00111 *4*; α(L)=0.00017 *1*
1454.6 *3*	2.7 *4*	1773.57	9/2$^+$	319.31	13/2$^+$			
[x]1464.6 *3*	2.2 *3*							
1469.0 *3*	2.8 *4*	1553.85	(5/2,7/2)$^-$	84.88	5/2$^-$			
1493.0 *3*	8.9 *4*	1577.9	(9/2)$^-$	84.88	5/2$^-$	E2	0.00315	α(K)exp=0.0035 *10* α=0.00315; α(K)=0.00256 *8*; α(L)=0.00044 *1*
[x]1530.2 *3*	2.1 *3*							
[x]1547.2 *3*	2.6 *3*							
1553.8 *3*	6.2 *4*	1553.85	(5/2,7/2)$^-$	0	3/2$^-$	E2	0.00238	α(K)exp=0.00167 *75* α=0.00238; α(K)=0.00238 *8*
1591.0 *3*	6.4 *4*	1675.9	5/2$^-$	84.88	5/2$^-$	E0+M1+E2	≥0.02	α(K)exp=0.0163 *34*; α(L)exp=0.00461 *72*
1604.2 *3*	4.6 *4*	1689.1	3/2$^+$,5/2$^+$,7/2$^+$	84.88	5/2$^-$	E1		α(K)exp=0.00070 *30*
[x]1610.4 *3*	1.7 *3*							
[x]1615.0 *3*	1.8 *3*							
[x]1618.0 *3*	2.7 *3*							
1627.1 *3*	3.7 *3*	1946.07	11/2$^+$	319.31	13/2$^+$			
[x]1632.0 *3*	3.5 *4*							
[x]1644.6 *3*	1.7 *3*							
[x]1647.1 *3*	4.8 *5*					M1		α(K)exp=0.0052 *10*
[x]1649.4 *3*	1.9 *3*							
[x]1655.4 *3*	2.2 *3*							
[x]1664.5 *3*	3.6 *3*							
[x]1690.1 *3*	1.5 *3*							
[x]1742.7 *3*	2.6 *3*							
[x]1771.1 *3*	6.2 *4*					M1		α(K)exp=0.0054 *15*
[x]1790.6 *3*	2.2 *3*							
[x]1802.9 *3*	4.4 *9*							
1881.5 *3*	3.3 *3*	2200.55	13/2$^+$	319.31	13/2$^+$	E0+M1+E2		α(K)exp=0.0058 *11*
[x]1904.2 *3*	1.9 *2*							
[x]1938.2 *3*	2.1 *3*							
[x]1943.5 *3*	2.4 *3*							
[x]1966.1 *3*	1.7 *3*							

$^{197}_{82}Pb_{115}$-5

$\gamma(^{197}Pb)$ (continued)

† Relative intensity renormalized to Iγ(854.5γ)=100.
‡ From α(K)exp measurements, except as noted.
# From adopted γ radiations.
@ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
& Multiply placed with undivided intensity.
x γ ray not placed in level scheme.

$^{197}_{82}Pb_{115}$-6

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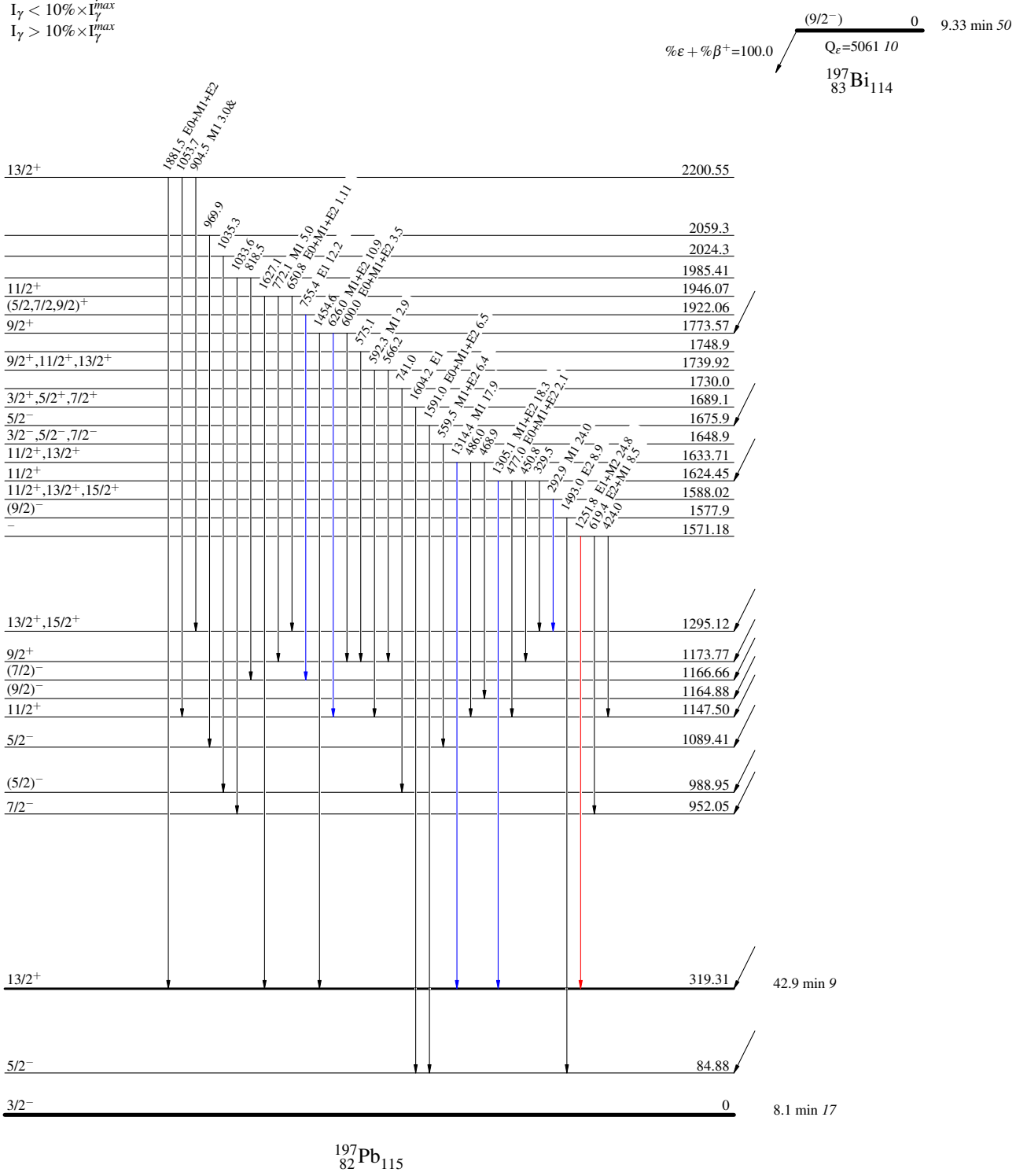
Decay Scheme

Intensities: Relative $I_{(\gamma+ce)}$
& Multiply placed: undivided intensity given

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



^{197}Bi ε decay (9.33 min) 1991Va09

Decay Scheme (continued)

Intensities: Relative $I_{(\gamma+ce)}$
& Multiply placed: undivided intensity given